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FURTHER NOTES ON COWRIES OF THE COASTS OF KENYA AND TANZANIA

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INTRODUCTION

Thirty-nine species of *Cypraea* were listed by Schilder and Schilder (1938–39) as being present on East African coasts. Verdcourt (1954, 1955, 1959, 1960) recorded detailed information on the occurrence of 50 species. Additional information for the Dar es Salaam area has been given for 37 species by Spry (1961) and for 41 species by Woltz & Belcher (undated), whilst Liversidge (1963 b) has noted 33 species from Diani Beach, Kenya. A later check list covering 49 species was presented by Robson (1966).

Burgess (1970) in his book 'The living cowries' indicates 50 species as having an East African distribution. In Table I, 52 species of *Cypraea* are listed summarizing this previous information, the two extra species being those regarded as authentic by Verdcourt—*C. errones* (1959) and *C. miliaris* (1960). On the other hand *C. bistrinotata* and *C. contaminata* were not noted by Verdcourt. Burgess now doubts that *C. bistrinotata* occurs on the East African coasts (pers. comm.). He records (1970) identifying a specimen of *C. contaminata* collected by Mr. Fainzilber in Zanzibar.

Three species mentioned by Verdcourt still have to be confirmed for East Africa: *C. edentula* Gray 1825 (1959); *C. grayana* Schilder 1930 (1959); *C. pantherina* Lightfoot 1786 (1955). *C. grayana* was listed by Schilder & Schilder (1938–39) as present on the Indian Ocean coast of Somalia and in the Seychelles, but Burgess (pers. comm.) has no unquestionable locality data for this species (or *C. pantherina*) south of the Horn of Africa. *C. beckii* Gaskoin 1836 was noted by Woltz & Belcher (undated) as having been found in East Africa but I have been unable to trace this record. Two other species should be sought as I purchased them from a trader at Diani beach: *C. boivinii* Kiener 1843, which I cannot assign to *C. gangranosa*, and *C. ocellata* Linné 1758, which was sold to me as *C. marginalis* but is quite clearly the wrong colour for this species, *C. ocellata* was listed by Schilder & Schilder (1938–39) as present in Mauritius and the Gulf of Aden.

This note provides further information on sources in Kenya and Tanzania from observations by the author and others, with particular reference to beaches near Tanga and Mombasa, together with some comments on specific identities. The order of presentation is alphabetical by species in view of contentions that the previous divisions into many genera are not valid. Kay (1957, 1960, 1961) considers there are only two groups based on the anatomy of the living animals. whilst Verdcourt (1956) notes that *C. tigris* and *C. pantherina*, which he says can hybridize, have been placed in separate genera. Nevertheless the previous genera do bring together species with similar shell characteristics and have been noted in Table I.

Data on maximum and minimum sizes of specimens collected by the author and his family are given in Table II together with sizes of specimens in the collection at the National Museum, Nairobi; for convenience this table also includes information on sizes from other papers in the literature. From Table II it will be noted that specimens of the following species from locations on the East African coasts are required to complete the collection in the National Museum, Nairobi: *cicercula, contaminata, errones, gangranosa, gracilis, hirundo, mappa, marginalis, microdon, poraria, turdus* and *ziczac*.

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Table I

List of Cypraea SPP. mentioned in various Publications, especially those about East African coasts

	Old generic names		Species	Race	References
	(Schilders, Spry, Verdcourt)	(Allan, Robson)			
1.	*Monetaria* Troschel 1863	*Ornamentaria* Schilders 1939	*annulus* Linné 1758		3(172), 10, 11, 12, 16(60A), 22(1), 23.
			„	*camelorum* Rochebrune 1884	1, 13(27), 14(36), 17, 20, 21.
2.	*Mauritia* Troschel 1863	*Arabica* Jousseaume 1884	*arabica* Linné 1758	*immanis* Schilders 1939	1, 3(101), 10, 11, 13(32), 14(150), 16(61), 17, 20, 21, 22(2).
3.	*Talparia* Troschel 1863	*Arestorides* Iredale 1930	*argus* Linné 1758	*contrastriata* Perry 1811	1, 3(124), 10, 11, 13(49), 14(142), 16(63), 17, 20, 21, 22(3).
4.	*Palmadusta* Iredale 1930	*Evenaria* Iredale 1930	*asellus* Linné 1758		1, 3(49), 11, 13(37), 16(64), 17, 20, 21, 22(4).
5.	*Pustularia* Swainson 1840		*bistrinotata* Schilders 1937		3(132).
6.	*Erosaria* Troschel 1863	*Ravitrona* Iredale 1930	*caputserpentis* Linné 1758		1, 3(80), 10, 11, 13(28), 14(25), 16(65), 17, 21, 22(5), 23.
7.	*Cypraea* Linné 1758	*Ponda*	*carneola* Linné 1758	*sowerbyi* Anton 1839	1, 3(94), 10, 11, 13(12), 14(162), 16(66), 17, 21, 22(6), 23.
		Jousseaume 1884	„	*titan* Schilders 1962	3(94), 15.
8.	*Erronea* Troschel 1863	*Ovatipsa* Jousseaume 1884	*caurica* Linné 1758		1, 3(146), 10, 11, 13(17), 16(67) 20, 20, 21, 23.
			„	*dracaena* Born 1778	1, 3(146), 14(74), 17, 22(7).
			„	*elongata* Perry 1811	1, 14(74), 17, 20, 22.
9.	*Cribraria* Jousseaume 1884	*Ovatipsa*	*chinensis* Gmelin 1791	*violacea* Rous 1905	1, 3(27), 10, 11, 13(18), 14(113), 16(68), 17, 18, 20, 21, 22(8).
10.	*Pustularia*	*Pustularia*	*cicercula* Linné 1758	*lienardi* Jousseaume 1884	1, 3(131), 11, 13(44), 20, 21, 22(9).
11.	*Palmadusta*	*Palmadusta*	*clandestina* Linné 1758	*passerina* Melvill 1888	1, 3(34), 11, 13(3), 14(84), 16(69), 17, 20, 21, 22(10), 23.
12.		*Palmadusta*	*contaminata* Sowerby 1832	*distans* Schilders 1938	1, 2, 3(39), 13(7), 22.
13.	*Cribraria*	*Cribraria*	*cribraria* Linné 1758	*comma* Perry 1811	1, 3(87), 10, 11, 13(2), 14(115), 16(70), 17, 20, 21, 22(11), 23.
14.	*Mauritia*	*Arabica*	*depressa* Gray 1824	*dispersa* Schilders 1939	1, 3(103), 11, 13(33), 16, 17, 20, 21.
15.	*Palmadusta*	*Palmadusta*	*diluculum* Reeve 1845		1, 2, 3(35), 11, 13(4), 14(90), 16(72), 17, 21, 22(43)
			„	*virginalis* Schilders 1939	1, 3(35), 11, 13(5), 16(72A), 22(44)
			„	*magnifica* Coen 1949	4
16.	*Erosaria*	*Erosaria*	*erosa* Linné 1758		1, 3(78), 10, 11, 13(20), 14(28), 16(73), 17, 20, 21, 22(12), 23.
			„	*similis* Gmelin 1791	3(78), 14(28).
17.	*Erronea*	*Erronea*	*errones* Linné 1758		20.
18.	*Palmadusta*	*Melicerona* Iredale 1930	*felina* Gmelin 1791		1, 3(175), 10, 11, 13(39), 14(92), 16(74), 17, 20, 21, 22(13).

Table 1 Continued

	Old generic names		Species	Race	References
19.	*Palmadusta*	*Paulonaria* Iredale 1930	*fimbriata* Gmelin 1791		1, 3(58), 11, 16(75), 22(14).
			„	*durbanensis* Schilders 1938	1, 3(58), 10, 13(40), 17, 20, 21.
20.	*Erosaria*	*Ravitrona*	*gangranosa* Dillwyn 1817	*reentsii* Dunker 1852	1, 3(62), 10, 13(29), 14(20), 17, 21, 22.
21.	*Pustularia*	*Pustularia*	*globulus* Linné 1758	*brevirostris* Schilders 1938	1, 3(133), 10, 11, 13(45), 14(4), 17, 20, 21, 22(15).
22.	*Palmadusta*	*Paulonaria*	*gracilis* Gaskoin 1848	*notata* Gill 1858	1, 3(59), 11, 13(41), 18, 20, 21.
23.	*Erosaria*	*Ravitrona*	*helvola* Linné 1758	*argella* Melvill 1888	1, 3(68), 10, 11, 13(30, 14(24), 16(76), 17, 20, 21, 22(16), 23.
24.	*Blasicura* Iredale 1930	*Evenaria*	*hirundo* Linné 1758		1, 3(140), 11, 13(43).
			„	*francisca* Schilders 1938	1, 14(105), 17.
25.	*Mauritia*	*Arabica*	*histrio* Gmelin 1791		1, 3(106), 10, 11, 13(34), 14(151), 16(77), 17, 20, 21, 22(17), 23.
26.	*Luria* Jousseaume 1884	*Basilitrona* Iredale 1930	*isabella* Linné 1758		1, 3(6), 10, 11, 13(50), 14(131), 16(78), 17, 20, 21, 22(18), 23.
27.	*Blasicura*	*Evenaria*	*kieneri* Hidalgo 1906		1(=ursellus), 3(139), 10, 11, 13(15), 14(103), 16(79), 17, 20, 21, 22(19), 23.
28.	*Erosaria*	*Erosaria*	*lamarckii* Gray 1825		1, 3(72), 11, 13(21), 14(33), 16(80), 17, 20, 21, 22(20).
29.	*Staphylaea* Jousseaume 1884	*Purperosa* Iredale 1930	*limacina* Lamarck 1810		1, 3(127), 11, 16(81), 22(21), 23.
			„	*interstincta* Wood 1828	10, 13(47), 14(13), 17, 20, 21.
30.	*Cypraea*	*Lyncina* Troschel 1863	*lynx* Linné 1758		1, 3(117), 10, 11, 13(8), 14(157), 16(82), 17, 20, 21, 22(22), 23.
31.	*Mauritia*	*Leporicypraea* Iredale 1930	*mappa* Linné 1758		3(120), 11, 13(11).
			„	*alga* Perry 1811	1, 3(120), 13(10), 14(146), 16(82A), 17, 20, 21, 22(23).
			„	*geographica* Schilders 1933	22(24).
32.	*Erosaria*	*Erosaria*	*marginalis* Dillwyn 1827		1, 2, 3(74), 10, 14(31), 17, 20,21.
			„	*pseudocellata* Schilders 1938	10, 13(22), 22(25).
33.	*Mauritis*	*Mauritia*	*mauritiana* Linné 1758		1, 3(119), 11, 13(36), 14(154), 16(83), 17, 20, 21, 22(26).
34.	*Palmadusta*	*Paulonaria*	*microdon* Gray 1828	*chrysalis* Kiener 1843	1, 3(54), 8, 9, 10, 11, 13(42), 14(98), 16(83), 17, 20, 21, 22(27).
35.	*Erosaria*	*Erosaria*	*miliaris* Gmelin 1791	*inocellata* Gray 1825	1(=*metavona* Iredale 1935), 21.
36.	*Monetaria*	*Monetaria*	*moneta* Linné 1758		3(173), 10, 11, 13(25), 14(38), 16(84), 17, 20, 21, 22(28), 23.
			„	*icterina* Lamarck 1810	1, 3(173), 13(26), 14(39).
37.	*Erosaria*	*Erosaria*	*nebrites* Melvill 1888		1, 3(79), 10, 11.
			„	*mozambicana* Schilders 1938	13(23), 14(29), 17, 20.
38.	*Staphylaea*	*Nuclearia* Jousseaume 1884	*nucleus* Linné 1758	*madagascariensis* Gmelin 1891	1, 3(128), 11, 13(46), 14(15), 16(85), 17, 20, 21, 22(29).
39.	*Erronea*	*Adusta* Jousseaume 1884	*onyx* Linné 1758	*adusta* Lamarck 1880	1, 3(29), 11, 13(1), 14(65), 16(86), 17, 20, 21, 22(30).
40.	*Blasicura*	*Evenaria*	*owenii* Sowerby 1937	*vasta* Schilders 1938	1(=ursellus), 3(142), 13(16), 16(87), 17, 20, 21, 22(31).
41.	*Erosaria*	*Ravitrona*	*poraria* Linné 1758		1, 3(66), 10, 11, 13(31), 17, 20, 21, 22.

Table 1 Continued

	Old generic names		Species	Race	References
42.	*Palmadusta*	*Evenaria*	*punctata* Linné 1758		1, 3(41), 10, 11, 13(38), 16(88), 18, 20, 21, 22(32).
43.	*Mauritia*	*Arabica*	*scurra* Gmelin 1791		1, 3(107), 10, 11, 13(35), 16(88A), 17, 20, 21, 22(33).
			,,	*indica* Gmelin 1791	20.
44.	*Staphylaea*	*Staphylaea*	*staphylaea* Linné 1758		1, 3(126), 10, 11, 16(89), 22(34).
			,,	*laevigata* Dautzenberg 1932	13(48), 14(12), 17, 20, 21.
45.	*Blasicura*	*Bistolida* Cossman 1920	*stolida* Linné 1758	*diauges* Melvill 1888	1, 3(144), 10, 11, 13(14), 14(108), 16(90), 17, 20, 21, 22(35).
			,,	*fluctuans* Iredale 1936	22(36).
46.	*Talparia*	*Talparia*	*talpa* Linné 1758	*imperialis* Schilders 1938	1, 3(92), 10, 11, 13(52), 14(143), 16(91), 17, 20, 21, 22(37), 23.
47.	*Cribraria*	*Talostolida* Iredale 1930	*teres* Gmelin 1791		3(45), 11.
			,,	*subfasciata* Link 1807	1, 13(19).
				alveolus Tapparone 1882	1, 3(45), 10, 14(110), 17, 18, 20, 21, 22(38).
48.	*Callistocrypraea* Schilder 1927	*Chelycypraea* Schilder 1930	*testudinaria* Linné 1758	*ingens* Schilders 1938	1, 3(121), 10, 11, 13(51), 14(137), 16(93), 17, 20, 21, 22(39).
49.	*Cypraea*	*Cypraea*	*tigris* Linné 1758		1, 3(111), 10, 11, 13(9), 14(155), 16(94), 17, 21, 22(40), 23.
50.	*Erosaria*	*Erosaria*	*turdus* Lamarck 1810		1, 3(112), 11, 13(24), 14(35), 17, 20, 21.
			,,	*zanzibarica* Sullioti 1911	14(35), 21, 22.
51.	*Cypraea*	*Mystaponda* Iredale 1930	*vitellus* Linné 1758	*dama* Perry 1811	1, 3(98), 10, 11, 13(13), 14(158), 18(91), 17, 20, 21, 22(41), 23.
52.	*Palmadusta*	*Palmadusta*	*ziczac* Linné 1758	*misella* Perry 1811	1, 2, 3(36), 11, 13(6), 14(89), 17, 20, 21, 22(42).

The numbers in brackets after reference numbers indicate the list number in the publications.

Table II

Size data for Cypraea SPP. found on East African coasts (MM)

Species	World range	Schilders (Mean) (1938–39)	Verdcourt (1954–1960)	Spry (max.)	Liversidge	Woltz & Belcher	National Museum Nairobi	Author's Collection	Rampton
annulus	7–34	21(72)	20–*31*(71)	28	15–21	10–25.5	14.5(69,48)–29(72,52)	*7.5*(60,53)–26(75,56)	
arabica	25–94	72(63)	*c.*75–84(61)	78	65–85	*51*–76.5	65(64,52)–81.5(64,51)	62(68,53)–85(63,59)	*88*
argus	44.5–105	70(62)	70–*86*	65	72	*44.5*–76	70(55,44)	81(64,41)	
asellus	10–31		*13*–20	19		15–*23*	18(61,47)–21(57,45)		
caputserpentis	15–43	32(72)	27–36	36	*23*	*23–38*	37.5(75,48)	25.5(71,51)–35(74,44)	
carneola	17–99	33(62)	25–60	55	24–63	*20.5–71*	24(65,50)–65(57,48)	23.5(62,47)–60(60,51)	
caurica	19–68	35(55)	25–*53*(40)	45	36–43	*20.5*–51	23(54,46)–45(56,46)	27(59,46)–45(58,46)	
chinensis	21–48.5	31(73)	25–45(53)	36	27–29	23–45.5	28.5(67,49)–33.5(60,48)	25.5(69,53)–38.5(62,45)	
cicercula	10.5–22		14.5(59)–21(62)	*22*					
clandestina	8–25	17(60)	16(66)–*23*	21		*10*–20.5	13(62,50)–19(63,50)	13(58,42)–20(63,50)	
contaminata	10–14								
cribraria	10–41	24(61)	16–22	22	16–22	*15–25.5*	16(59,47)–21(67,52)	24(56,48)*	
depressa	25–55.5		36(75)				*48*(70,48)		*34*(71,50)
diluculum	11–36	24(61)	*16*–28	21		17.5–*35*–*5*	18(61,53)–28(64,50)	18(56,47)–26(60,48)	
erosa	16–71	34(63)	*21–50*(60)	41	38–39	23–45.5	30(57,43)–47(59,45)	27.5(65,49)–41(59,46)	
errones	16.5–42.5		22.5(53)						
felina	11–26	22(60)	*c.*20–22(64)	22	20	*12.5–23*	14(57,43)–19(61,47)	20(63,48)	
fimbriata	8–21	12(57)	12.5(56)–18(56)	15	11.5–14	*9–20.5*	12(58,46)–17(56,41)	11(55,45)–16(59,47)	
gangranosa	12.5–23	16(62)	13–*15*		*12.5*				
globulus	9–23.5	13(61)	13(58)–*21*(62)		11–15.5	9–23.5	12(63,54)–13(62,54)	17(59,53)*	
gracilis	12.5–26.5		*16*(56)–*21*						
helvola	8–35	22(67)	18–*32*	29	14–25	12.5–28	18(67,53)–25(70,60)	15(67,50)–28.5(70,53)	
hirundo	13–22	14(56)							
histrio	23–79	57(62)	43.5–70(57)	70	52–62	*43–76*	49(59,50)–66(61,50)	44.5(61,51)–72(62,51)	
isabella	11–54	27(55)	30–*40*	33	*12.5*–29.5	15–38	21.5(56,47)–35(56,47)	19.5(59,46)–31,5(54,44)	
kieneri	10–24	21(55)	12–20	20	14–19	12.5–20.5	*11*(55,41)–*21*(57,45)	14(57,43)–20(56,43)	
lamarckii	21–51	39(64)	*c.*40–*51*(61)	41		30–48.5	*25.5*(67,51)–40(63,51)	32.5(71,55)–43.5(64,51)	
limacina	12–37	25(57)	20–27	22	16–22	15–28	16(56,44)–*29.5*(58,49)	*13*(57,46)–26(58,46)	
lynx	18–85	38(61)	30–52.5	43	29.5–43	*23–56*	26.5(58,47)–46(63,53)	24(63,50)–49(61,54)	
mappa	40–97	67(51)	*60*–73	63		63.5–*89*		64(67,56)*	
marginalis	19–32	26(64)	26		26	*25.5–30.5*			
mauritiana	43–130	79(68)	*c.*85–95	100		*68.5–101.5*	78.5(70,55)–91.5(74,54)	89(74,52)–86(72,54)	
miliaris	27.5–44		23(56)						
microdon	8–15	13(55)	13(54)–*15*(50)		*9*(56)–12(50)	*9*–12.5			
moneta	10–42	28(66)	*15*–33	29		*15*–28	16.5(79,48)–30.5(82,49)	16(69,50)–*36.5*(66,45)	
nebrites	23.5–34.5	26(65)	*34.5*(65)		23 ?		*26*(62,46)		
nucleus	11–31	22(64)	*c.*26	25		*15–28*	20(55,48)–25(62,48)	21(60,48)	
onyx	24–55	43(60)	*c.*40–*53*(57)			*30.5*–48.5	32(59,48)–47.5(58,50)	43.5(62,53)	
owenii	8–27		16.5(67)–17			*10–17.5*	16(63,47)		
poraria	12.5–24.5		*c.*17–*22*		14				

Table 11 Continued

Species	World range	Schilders (Mean) (1938-39)	Verdcourt (1954-1960)	Spry (max.)	Liversidge	Woltz & Belcher	National Museum Nairobi	Authors's Collection	Rampton
punctata	7–22		13.5(60)–19(47)	19	18	*7.5–20.5*	13.5(59,48)–16(56,47)	15.5(58,48)*–17.5(54,46)*	
scurra	23–57		*c.*43–45(53)		27	*25.5*–45.5	34(56,44)–42(55,44)	41(59,45)–*45*(54,43)	
staphylaea	7–28	17(52)	17–20	17	13–16.5	*10*–20.5	11.5(61,52)–18(58,47)	12(67,50)–*21*(62,50)	
stolida	15–52	25(55)	*c.*30–31(52)	30	19	*18–38*	26.5(58,47)–30(57,43)	28(55,45)–30(58,47)	
talpa	22.5–100	64(52)	*c.*60–*83*(47)	68	54	*43*–76	52(52,42)–64.5(53,45)	56(51,42)–75(53,45)	
teres	13.5–45	30(55)	*17*(53)–40(48)	30	27–39	20.5–*40.5*	22(55,43)–39.5(48,41)	21(55,45)–34(54,44)	
testudinaria	74–140	112(51)	*100*(47)–*134.5*(50)	125	106	101.5–127	110(49,40)–112(52,40)	119(49,42)*	
tigris	44–147	89(69)	*58.5*–105	95	83–95	63.5–*114.5*	63(75,57)–105(70,54)	67(70,54)–102(67,55)	
turdus	19.5–47.5	31(69)	*c.*30–38(76)						
vitellus	20–100	49(64)	*25–75*	55	27–47	25.5–63.5	26(65,54)–50(62,55)	31(61,53)–61.5(63,54)	
ziczac	10–26	18(63)	18			*15–25.5*			

Notes: Figures in brackets are percentages of the previous lengths. One figure only is width; two figures are width followed by height.
Lengths in italics are the minima and maxima for the above East African data; all lengths to nearest 0.5 mm.
World range figures are taken from Burgess (1970) or Woltz & Belcher where their figures (ex Hawaiian Shell News, Oct. 1964) give a wider range, modified to include East African data where appropriate.
Asterisks indicate a purchased specimen.

Notes on Sources

C. annulus is the most common cowrie found in Kenya and Tanzania. The minute one in Table II was found by the author at Signal Station Beach, Ras Kazone, Tanga. Orr (1959) in her studies of this species on Zanzibar beaches recognizes four ecotypes, three of which cut across the characters of several geographical races.

C. arabica occurs on many beaches from Tanga to Pangani and it has also been found at Vipingo, Tiwi and Shimoni, but in the last few years it has been much harder to locate. The large specimen in the late Mr C. S. Rampton's collection (Table II) was found at Shimoni.

C. argus is a rare species. One beach-worn specimen was collected on Kerenge Island near Tanga but it has been found on the reefs of Maziwe Island near Pangani (Mr and Mrs J. R. Bradstock, pers. comm.) and in the Shimoni area (Mr and Mrs R. Jessop, pers. comm.). It is being collected by fishermen at Diani.

C. asellus has been found in the Shimoni area (Mr and Mrs Jessop, Mrs F. Melesi, pers. comm.) and at Msambweni (Mrs G. Webb, pers. comm.).

C. caputserpentis was uncommon in the Tanga area, but several specimens were found at Vipingo, Tiwi and Kikambala, the others in the author's collection being from the Dar es Salaam area. At Vipingo its occurrence is apparently seasonal (Mr C. S. Rampton, pers. comm.).

C. carneola is fairly common and widely distributed.

C. caurica is also common and widely distributed.

C. chinensis is infrequently found, but has been recorded from Kigombe, Fungu Nyama and Ras Kazone, Tanga, Tiwi, Vipingo and Shimoni.

C. cicercula occurs in the Shimoni area (Mr and Mrs Jessop, Mrs Webb, pers. comm.). Several of their specimens, which I have examined, show characteristics of *C. margarita* Dillwyn 1817—less granulation on the dorsal surface and the teeth less pronounced. It has been found at Kikambala (Mrs Melesi, pers. comm.).

C. clandestina is fairly widely distributed although not common. It has been found at Vipingo, Tiwi, Shimoni and several of the Tanga beaches.

C. contaminata has been found in the Shimoni area (Mr and Mrs Jessop, pers. comm.) and at Kilifi (Mrs B. Ruck, pers. comm.).

C. cribraria has been reported from Shanzu, Shimoni, Ras Kazone, Tanga, and Vipingo where it is apparently seasonal (Mr Rampton, pers. comm.). It is being found by fishermen at Diani.

C. depressa has been reported from Shanzu, and from Wesa (Mrs Ruck, pers. comm.).

C. diluculum is fairly widely distributed but not common. It has been found at Vipingo, Shimoni, Signal and Ras Kazone beaches, Tanga, including the form *virginalis*. In the Tanga area it favours sites near breakwaters. Coen (1949) describes a variety *magnifica* from Zanzibar.

C. erosa is widely distributed and common.

C. felina is not common but has been found at Vipingo, Shanzu, Waa, Tiwi, Shimoni and Tanga.

C. fimbriata is widely distributed but rather uncommon. It has been collected from Tiwi, Vipingo, Shimoni and many of the beaches in the Tanga area. One specimen was seen on the inner reef at Diani when other cowries were absent.

C. gangranosa is rare but has been found at Port Reitz (Mrs Ruck, pers. comm.).

C. globulus has been found in the Shimoni area (Mr and Mrs Jessop, Mrs Webb, pers. comm.).

C. gracilis has been found in the Shimoni area (Mr and Mrs Jessop, pers. comm.), at Waa (Mrs Melesi, pers. comm.), at Ngomeni (Mrs Webb, pers. comm.) and at Kikambala (Mrs Ruck, pers. comm.).

C. helvola appears to be found less frequently on the Kenya beaches than in the Tanga and Pangani areas.

C. hirundo: some shells which I have examined in Mr and Mrs Jessop's collection from the Shimoni area could be allocated to this species. It has been found at Kilifi (Mrs Ruck, pers. comm.).

C. histrio is fairly common and widely distributed.

C. isabella is less common on the Kenya beaches than on those in the Tanga area.

C. kieneri is fairly common at Vipingo, Waa, Tiwi and Shimoni but was seen less frequently in the Tanga area.

C. lamarckii is quite common on muddy beaches, especially by fish traps, for example on the beaches below the fishmarket and hospital at Tanga.

C. limacina is fairly widespread and frequent in the Tanga area and has been found at Vipingo, Tiwi and Shimoni.

C. lynx is a common and widespread species.

C. mappa is rare. It has been reported from Maziwe Island, Pangani (Mr and Mrs Bradstock, pers. comm.); it has been found near Shimoni (Mr and Mrs Jessop, pers. comm.) and at Bamburi (Mrs Melesi, pers. comm.).

C. marginalis has been found at Malindi (Mrs Webb, pers. comm.), and at Kilifi and Kikambala (Mrs Ruck, pers. comm.).

C. mauritiana is uncommon. It has been found in large cracks and crevices in blocky rough coral at Kigombe and Vipingo, and also at Mombasa (Mrs Melesi, pers. comm.).

C. microdon has been found in the Shimoni area (Mr and Mrs Jessop, pers. comm.).

C. moneta is common and widely distributed. The large specimen in Table II was found on Ulenge reef, Tanga Harbour.

C. nucleus is uncommon, but has been found at Vipingo, Tiwi and Ras Kazone, Tanga.

C. onyx is uncommon. It has been found on rather muddy beaches: Hospital beach, Tanga, and in Mombasa Harbour.

C. owenii is rare but has been found at Kilifi (Mrs Ruck, pers. comm.), and Dr Burgess (pers. comm.) has a specimen collected in Zanzibar.

C. poraria is also rare. It has been found in the Shimoni area (Mr and Mrs Jessop, Mrs Webb, pers. comm.), at Bamburi (Mrs Melesi, pers. comm.) and in deep water at Mtwapa (Mrs Ruck, pers. comm.).

C. punctata is uncommon. It has been found at Shimoni (Mr and Mrs Jessop, Mrs Webb, pers. comm.) and Ras Kazone, Tanga. It is being collected by fishermen at Diani.

C. scurra is difficult to find as it is embedded in coral. Specimens have been collected from Kilifi, Vipingo, Shimoni and Ras Kazone, Tanga.

C. staphylaea is fairly widely distributed but is less common at Vipingo and Tiwi than in the Tanga area.

C. stolida is not common. It was found on Kigombe beach in a sandy pool and it has been reported from Ras Kazone, Tanga. It has been found at Shimoni (Mr and Mrs Jessop, Mrs Melesi, Mrs Webb, pers. comm.).

C. talpa is found infrequently. At Ras Kazone, Tanga, it was found usually in shallow pools full of seaweed.

C. teres is widely distributed but not common. It has been found at Vipingo, Tiwi, Shimoni, Ras Kazone and Kerenge Island, Tanga.

C. testudinaria is rare but it has been found on the outer edge of Niule reef, Tanga (Dr J. French, pers. comm.), in the Shimoni area (Mr and Mrs Jessop, pers. comm.) and at Shanzu, (Mrs Melesi, pers. comm.).

C. tigris is common and widely distributed.

C. turdus has been found in Northern Kenya (Mrs Webb, pers. comm.) and has been reported from Shanzu.

C. vitellus is widely distributed but is more common around Tanga than on the Vipingo and Tiwi beaches.

C. ziczac is being found by fishermen at Diani and Vanga, but it is rare. It has been found at Port Reitz (Mrs Melesi, pers. comm.).

Notes on Specific Identities

C. annulus. The work of Orr (1959) indicates that it is not correct to assign specimens from the East African coasts to the race *camelorum*.

C. arabica. Although the race *immanis* is East African (Schilder & Schilder 1938–39), the range of variation in specimens I have seen suggests that not all the shells of this species from East African coasts can be allocated to this race.

C. argus. The race *contrastriata* type specimen is from Zanzibar, but Allan (1956) does not agree with its separation by Schilder & Schilder (1938–39).

C. carneola. The race *titan* is given by Schilder & Schilder (1962) as from East Africa but Burgess is unable to separate it on conchological characters.

C. caurica. Although some specimens can be referred to the races *dracaena* and *elongata*, in view of Burgess' remark that nearly all the 'races' can be seen on Mauritius it would seem best to avoid allocating East African specimens to races. (Coen, 1949, describes two other races from Somalia—*immaculata* and *pseudarabicula*). In the author's collection the dorsal background colour is pale blue to greenish blue with three dark bands usually present. The khaki freckling is usually dominant and in many cases there is darker brown blotching in the centre of the dorsum. The flesh-coloured margins are somewhat thickened and in some instances this thickening partially covers the marginal spots. The sunken spire has a dark-brown spot and there are large dark-brown blotches at both ends of the outer margin with a smaller mark at the posterior end of the inner margin. The outer teeth are strong with darker grooves between them. The inner teeth are strong anteriorly but the posterior two-thirds are much finer. The more elongate shell type has breadth and height 50% and 42% of its length compared to 56% and 46% for the less elongate type.

C. chinensis. The specimens from East Africa show considerable variation and support Burgess' view that racial separation is not justified. It may be that there are ecotypes.

C. clandestina. As only one of my collection has the dorsal orange markings at the extremities, and as the specimens from East Africa in the National Museum, Nairobi differ little from a group from Ceylon, the allocation of East African specimens to the race *passerina* does not seem to be justified.

C. diluculum. Before Burgess' book was published (1970) I considered that this shell should be separated from *ziczac* in view of the different animal colours. I am not convinced that *virginalis* is a separate race as I have specimens intermediate between the normal *diluculum* and the *virginalis* variation i.e. with marginal spots but no blotches at the extremities. Moreover the geographical separation reported by Schilder & Schilder (1938–39) does not apply now, and I have been advised that both types have been found together under the same coral block in Mozambique (Dr C. M. Burgess, pers. comm.).

As Coen's paper (1949) is not readily accessible and is written in Italian, a translation of his description of the variety *magnifica* of *C. diluculum* from Zanzibar is given for convenience:

'In this very beautiful variety, larger than the type, the pattern of the back is remarkable: the lower and upper areas consist of very regular bands of thin parallel white lines on a blackish ground, flanked by half-moon patterns, each of which develops in orderly fashion from one of the white lines; a third intermediate band consists of a series of arrow-shaped white blotches with the point to the right; the whole pattern is admirably regular and geometric. Base and sides are scattered with little irregularly placed spots; the whole surface has a brilliant glassy sheen. Size: 28 mm long, 17.5 mm wide'.

C. erosa. From the nature of my specimens without any marginal blotches I suggest they are late immature forms. It is possible to grind away the marginal blotches. The phase of this late development I suggest is firstly the disappearance of small streaky spots on the margins as they thicken. Then part of the inner blotch appears on the base near the inner margin followed by a second portion above the margin rim, these two portions coalescing to give the adult blotch. The outer blotch can start whilst the inner one is in two portions and seems to start just above the rim.

C. errones. Verdcourt would seem to be correct in his identification of the shell found by Mrs Childs at Mtwara but this shell is considered as having a range in the eastern Indian and the western Pacific Oceans.

C. fimbriata. None of the specimens in my collection or that of the National Museum, Nairobi, conform to the illustration of *durbanensis* in Burgess' book, not even specimens from the Natal coast. Burgess (pers. comm.) notes that small shells of the *durbanensis* type have been found on the same reef as typical *fimbriata*.

C. helvola. The variations in shell shape, coloration and teeth in specimens in my collection are such that I cannot assign them all to the race *argella*.

C. histrio. Does this species hybridize with other closely related species? One of my specimens has the typical spire blotch but the margins and base resemble those of *C. arabica*.

C. kieneri. I am pleased to note that Burgess gives this separate specific rank in contrast to Allan (1956) who considers it synonymous with *ursellus.*

C. limacina. This cowrie is separated in typical specimens from *C. staphylaea,* being a larger shell with less nodulation on the dorsal surface and the teeth not extending across the base. However, I have seen intermediate forms in the collections of the British Museum, Natural History, and the National Museum, Nairobi, besides those in my own collection. In Nairobi Museum specimens numbered 1202 and 1203 have teeth right across the base, whilst 1204 has teeth partway across the base, but the dorsal surfaces are free of nodulation. One of my specimens with teeth right across the base is only slightly nodulated above the margins on the dorsal surface but it is rather small, only 21 mm in length. Another larger shell, 25 mm long has a completely smooth dorsum but the teeth extend well into the base and there are ridges at the edges of the margins. If the two species are separate, can they hybridize? As we have found both shells on the same beach it does not seem as if ecotypes explain the problem. Further clarification will probably require careful examination of the animals themselves.

C. mappa. Even Allan (1956) has queried the validity of the races of this species. Although *alga* is considered to be an East African form, less elongate shells without the purplish basal blotch occur.

C. miliaris. According to Iredale as reported by Allan (1956) the specific name *miliaris* is not valid. Verdcourt describes it under *C. inocellata* but from Burgess one notes that Gray listed it as a variety of *lamarckii.* Burgess lists it under *miliaris* ranging from Japan to Singapore and north-western to north-eastern Australia.

C. moneta. As Burgess notes that all but one form were found on the same reef the division into races and the separation of *icterina* as a species by Schilder & Schilder (1938–39) do not seem to be valid. The ecotypes noted by the Schilders are probably adequate to cover the variations in this species. In August 1977 on a portion of north Diani Beach a considerable number of this species was seen alive on a section of the inner reef. Some were nearly white with greenish transverse bands whilst others were bright yellow all over the dorsal surface but with these green bands showing also. In several cases the central dorsal patch was nearly white with the yellow colour surrounding it—this suggests the yellow colour is laid down as a stage of development.

C. nebrites. In view of comments by Verdcourt (1954) on the specific identity of this cowrie in relation to *C. erosa* the allocation of East African specimens to the race *mozambicana* would not seem to be justified. The specimens I have seen in the National Museum, Nairobi are markedly different in appearance from *erosa.*

C. nucleus. One of my specimens is a late immature phase with the granules not very pronounced; the dorsal line is indistinct and the teeth do not extend completely across the base.

C. onyx. The separation into races for this species seems to be more likely than for most others, although whether *adusta* can be separated from *succinta* is dubious: our specimen was overall dark brown on the dorsum when collected but now it has two light brown narrow transverse bands across the dorsum and a clear light dorsal line with the very dark brown portion extending up irregularly from the margins. Mr and Mrs Jessop have a specimen with the white pearly dorsal overlay which was found in Zanzibar.

C. staphylaea. Allan (1956) notes that Steadman & Cotton consider *laevigata* as synonymous with the typical form of the species. Burgess (pers. comm.) has noted that this species can have a smooth dorsum in the immature phase but the specimens referred to under *C. limacina* show no other signs of immaturity.

C. stolida. Woltz & Belcher (undated) allocate the race *fluctuans* to specimens without dorsal blotch. Although Allan says this is a characteristic of *fluctuans* the specimen of this race illustrated by Burgess has a very marked dorsal blotch and he states that *diauges* often has no blotch. Verdcourt (1960) records that specimens of this species without the central blotch were collected in Zanzibar.

C. teres. As there are two variations found in East Africa (Burgess 1970) it is not logical to designate these as *alveolus* (a large variety from Zanzibar) nor as *sub-fasciata* which Schilder & Schilder (1938–39) reported as having a Melanesian distribution. Allan (1956) considers these names are synonymous.

C. vitellus. Comparison of East African specimens with those from elsewhere in the National Museum, Nairobi does not indicate that the local ones can be separated as the race *dama.*

To facilitate allocation of specimens to specific status on the reefs the following mantle or animal colorations may be of assistance:

orange to pink/red	—	*chinensis, contaminata, cribraria, fimbriata, gracilis, microdon, punctata, teres, ziczac;*
pure black	—	*asellus, clandestina, diluculum, isabella;*

pure yellow	—	*hirundo, owenii, stolida;*
grey or brown with yellow or orange	—	*cicercula, felina, globulus, kieneri* (transparent).

CONCLUSION

Further observations on the occurrence and size of *Cypraea* spp. on the East African coasts are required with notes on their habitats, time of year when observed and variatons in the specimens from the typical form of the species. Especially, information is required to determine whether the occurrence of some species is seasonal and on the following species:

bistrinotata, boivinii, cicercula, contaminata, depressa, edentula, errones, gangranosa, gracilis, grayana, hirundo, marginalis, miliaris, nebrites, owenii, pantherina, poraria and *turdus.*

I would suggest that such information be sent to the EANHS Bulletin for publication in the records section.

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ADDENDUM

Whilst this note was in press a list of 17 species found on Tiwi Beach was published (Dengates 1977). This adds Tiwi to the locations for *C. cribraria* and *C. talpa.*

The same report also mentions that a local fisherman had specimens of *C. boivinii*, which he claimed originated from Shimoni, but more positive evidence is required before this species is added to the list of East African cowries.

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